

Discrete Structures, Fall 2016, Homework 1

You must write the solutions to these problems legibly on your own paper, with the problems in sequential order, and with all sheets stapled together.

- Convert the following sentences to logical statements using symbols assuming that “ h ”, “ w ” and “ s ” represent the propositions below.
 h = “John is healthy.”
 w = “John is wealthy.”
 s = “John is wise.”
 - John is healthy and wealthy but not wise.
 - John is neither healthy, wealthy, nor wise.
 - John is neither wealthy nor wise, but he is healthy.
 - John is wealthy, but he is not both healthy and wise.
- For each of the sentences below, determine if the sentence is a statement. If the sentence is a statement, tell whether it is true or false.
 - How much would wood a woodchuck chuck if a woodchuck could chuck wood?
 - If I am enrolled in CS172, then the moon is made of green cheese.
 - This statement refers to itself.
 - This statement is false.
- Express the negations of the following statements in normal English sentences.
 - Sally is a computer science major and Sally’s brother is a math major.
 - Either the professor is late or my watch is fast.
- For each of the following statements, give the contrapositive, converse, and inverse statements (label them) in normal English, using the syntax “If ..., then ...” You may change verb tenses to improve the grammar.
 - If I forget to set my alarm, I will be late for class.
 - I will pass this class if I study hard.
 - You can go to the Justin Bieber concert only if you eat your vegetables.
- Let r , s and x be statements. Construct a complete truth table for the statement $(r \wedge \sim s) \rightarrow (\sim x \vee s)$.
- Are the statements $\sim(p \wedge q)$ and $\sim p \wedge \sim q$ logically equivalent? Use a complete truth table to justify your answer, and explain (in English) why the truth table supports your answer.